Ready Reckoner- Application Overview

Use of Rodrepel®™ in Wire and Cable based Applications

C Tech Corporation

Product Specialization Group

Generic Requirements

Rodrepel®™, non toxic , non hazardous and environmentally friendly anti rodent master batches

A brief overview on the use of Rodrepel®™ in Wire and Cable based Applications

CTECHCORPORATION
uncompromising quality

TECHNICAL NOTE

RODREPEL®™ FOR WIRE AND CABLE APPLICATIONS

Rodrepel®™ is a non- toxic, non- hazardous, environmentally safe additive specially developed for use as a master batch in polymeric applications as well as in coating applications.

Rodrepel®™ does not kill but keeps the pests away by making use of the sensory mechanisms. Rodrepel®™ is a product of Green Technology and is applicable for a variety of uses in a multitude of sectors.

It is a broad spectrum aversive adept at repelling all species of rodents.

Wires and cables are especially susceptible to damage from rodents. Rodents cause large scale damage due to their constant gnawing. Rodents gnawing through wires, optical fibre cables and automobile wiring are some of the most widespread complaints all over the world. Buried cable networks especially are the most affected. The consequences of this damage can be severe.

❖ LOSSES DUE TO RODENT ATTACK IN WIRE AND CABLE PROJECTS

Rodents are one of the major causes of polymer damage. Every year thousands of breaks in electrical cables are reported. These can cause short circuits which can lead to fire hazards. Damage to optical fibre cables can disrupt

transmission of information. One of the largest losses in terms of monetary loss comes from the automobile industry. Trouble of starting the car in the morning as a rat or a vole has eaten through the cable is of the problems faced by every car owner Rodents gnaw through the injection lines, fuel lines and wiring harness of automobiles. Under the hood damage due to rodents is one of the most common and most destructive. Every year thousands of dollars in automobile wiring damage are caused by rodents and this damage is not covered by insurance companies either. Rodent damage to signaling cables used in railways signaling can have dangerous effects.

The current rodenticides used are toxic and do not effectively solve the rodent problem. Also their toxic and harmful nature prevents their use in a variety of applications.

❖ SALIENT FEATURES

- Non-toxic
- Non- hazardous
- Environmentally safe
- Acts as an aversive
- Large life span of 5-40 years
- Thermally stable at temperatures as high as 1400 oC
- Does not leach into Groundwater and soil
- Does not volatize
- No harmful fumes

- Available as a LDPE and EVA masterbatch
- Can be customized according to customer requirement
- Inert in the polymer matrix
- Does not degrade in soil
- Chemically Stable
- Hazardous polymerization not likely to occur
- Not harmful if accidently inhaled or ingested
- Safe to add in pipes used for drinking water

❖ THERMAL STABILITY

Most of the termiticides and pesticides used volatize at high temperatures releasing harmful fumes. As temperature increases, vapour hazards increase. The vapors from many pesticides increase three to four times for each 10 C increase in temperature.

Rodrepel®™ is designed to withstand the high temperature of polymer processing. Rodrepel®™ is stable up to 1400 C and hence is safe to use in severe temperature conditions.

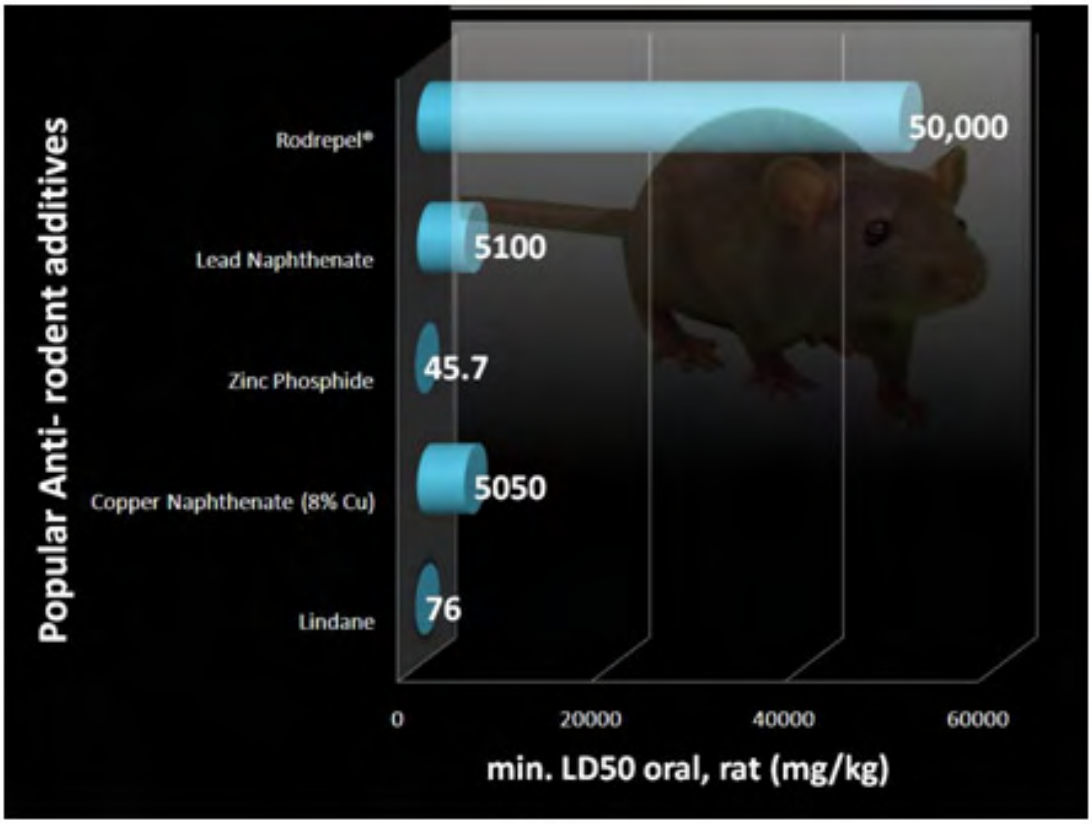
Thus Rodrepel®™ can safely be used even in high temperature applications with complete stability.

❖ NON-TOXICITY

The Lethal Dose and Lethal Concentration are used to determine the toxicity of most chemicals. The testing is mostly done with rodents and

mice. The LD50 is a method to measure the toxicity of a material. It is the amount of a chemical substance per 100 grams or per kilogram of the weight of the test animals that would cause the death of half (50%) of the test species.

Lower the LD50 value, higher is the toxicity as lesser quantity of the substance is enough to cause toxic effects. Rodrepel®™ has a very high LD50 value thus showing its non toxic nature.



The non-toxicity of Rodrepel®™ when compared with harmful rodenticides

❖ CRITICAL PARAMETERS

Sr. No.	Property	Test	Limits prescribed
1.	Effectiveness	Anti-rodent testing for evaluating the bioefficacy of the finished sample comprising of Rodrepel®™	Weight loss < 2% Average gnawing factor < 0.02
2.	Non toxicity	Oral LD50 tests for evaluating the toxicity of the masterbatch	Acute Oral LD50 (rat) > 8000mg/kg
3.	Long life span	Accelerated ageing tests followed by anti-rodent bioefficacy test to check the rodent repellence of the aged cables	Weight loss < 3% Average gnawing factor < 0.025 (Here initial weight would be the weight of the aged cable sample)
4	Compatibility	Tests to ensure the mechanical properties of the finished sample are not affected For wet core cable: - Proof test for minimum strain level - Peak Stripability force to remove primary coating of the fiber - Dynamic Tensile Strength - Dynamic Fatigue - Static Fatigue - Fiber Macro bend	1% 1.3 ≤ F ≤ 8.9 N Un-aged: ≥550KPSI (3.80 Gpa) Aged: ≥440 KPSI (3.00 Gpa) ≥ 20 ≥ 20 Fiber is coiled with100 turns on 30 ± 1.0 mm radius mandrel: - ≤ 0.05 dB at 1550nm - ≤ 0.5 dB at 1625nm

			Fiber is coiled with 1 turn around 32 ± 0.5 mm diameter mandrel: - ≤ 0.5 dB at 1550nm - ≤ 1.0 dB at 1625nm
		- Fiber Curl	≥ 4 meters radius of curvature
		For Dry core cable:	
		- Tensile strength Test	Strain < 0.25%, change in attenuation < 0.05 dB
		- Abrasion Test	No perforation & loss of eligibility of the marking on the sheath.
		- Crush Test (Compressive Test)	Change in attenuation ≤ 0.05 dB
		- Impact Test	Change in attenuation ≤ 0.05 dB
		- Repeated Bending	Change in attenuation ≤ 0.05 dB
		- Torsion Test	Change in attenuation ≤ 0.05 dB
		- Kink Test	Change in attenuation ≤ 0.05 dB
		- Cable Bend Test	Change in attenuation ≤ 0.05 dB, sheath will not show any cracks visible to the naked eye
		- Temperature Cycling (Type Test)	Change in attenuation ≤ 0.05 dB
		- Cable aging Test (Type Test)	Increase in attenuation ≤ 0.05 dB
		- Water Penetration Test (Type Test)	Seepage of water shall not be more than 1 meter
		- Test of Figure of 8 (Eight) on the cable (Type Test)	It shall be possible to make figure of 8 of minimum 1000 meters of the cable uncoiled from the cable reel without any difficulty. No visible damage shall occur.
		- Flexural Rigidity Test on the optical fiber cable (Type Test)	Change in attenuation ≤ 0.05 dB, sheath will not show any cracks visible to the naked eye
		- Static Bend test (Type Test)	Change in attenuation ≤ 0.05 dB, sheath will not show any cracks visible to the naked eye
		- Cable Jacket Yield Strength And Ultimate Elongation	Un-aged: Minimum elongation 400% Aged: minimum elongation 375%

❖ APPLICATIONS:

Rodrepel®™ can be customized for use in the following ways

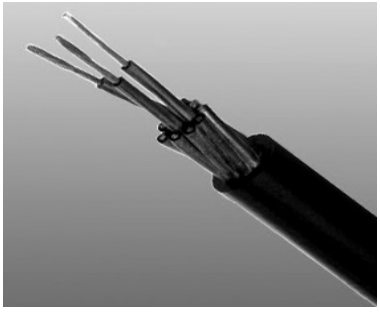
➢ Fibre Optic Cables

Rodrepel®™ can be added to fibre optic cables to protect them against rodent damage. It is useful in the transmission sector as well as the railway signaling sector

➢ Automobile wiring

Thousands of dollars in automobile damage due to rodents can be saved due to addition of Rodrepel®™ to the injection lines, fuel lines and wiring harnesses. Rodents have also been known to cause extensive damage to the line input to the automobile gas tank. They like to eat the wiring insulation and other rubberized components in the engine compartment. When they gnaw through the wiring, this often causes a short circuit, and also damage to the very expensive computer chips. This damage can be prevented by addition of Rodrepel®™ in the automobile wiring.

➢ Signaling Cables



Railway signaling is one of the most important applications in which Rodrepel®™ can be used. Outdoor railway signaling cables are suitable for control purpose in power & switching stations. Metallic armoring is usually used, but these are both expensive and have problems with respect to corrosion. Rodrepel®™ is both effective at preventing the

damage due to rodents and also not affected by the problems that affect metallic armoring.

❖ SAFETY AND VERSATILITY

- Rodrepel®™ is thermally stable and does not degrade on exposure to heat and light. It is soil stable and does not leach out to pollute the soil or air.
- It is completely inert in the polymer matrix apart from performing its main function of acting as an aversive.
- It is compatible with a number of polymeric bases depending on the end application
- Rodrepel®™ is RoHS and REACH compliant and FIFRA exempted.

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